

Since the summer of 1989, an interesting natural experiment has been in progress on Louisiana's southern Chandeleur Islands. These islands, previously uninhabited by any breeding species of large gull, were colonized not by one species but by two species that differ strikingly in appearance and whose normal breeding distributions are far-removed from the Chandeleur Islands and from each other. What would be the outcome of this natural experiment? Would both species flourish and coexist, maintaining their integrity through various isolating mechanisms? Would they multiply sufficiently to expand their new range and produce founder colonies? Would only one species persist due to competition or lack of potential mates? Would the colonization event fail altogether due to an insufficient number of original pioneers or other fac-

## Origins and Identification of Kelp × Herring Gull Hybrids

tors? Or would the two entities perhaps interbreed in the absence of an adequate number of initial founders, possibly homogenizing into a stable intermediate population or resulting in the genetic swamping of one population by the other?

# The “Chandeleur” Gull

On 8 July 1989, Larry O'Meallie and Dan Purrington visited Curlew Island in the Chandeleur Islands (Figs. 1a & b, p. 268) and were surprised to encounter a territorial pair of large, blackish-backed, yellow-legged gulls. Dutifully, they photographed the birds and submitted the record with a tentative identification of Lesser Black-backed Gull (Dittmann and Cardiff 2003). Their identification was understandable; the description superficially fit, and Lesser Black-backed Gull was on the increase in Louisiana and elsewhere in North America. A territorial pair of Lesser Black-backed Gulls on the Gulf Coast seemed far-fetched, but other contenders, e.g., Yellow-footed and Kelp Gulls, were beyond comprehension. Nearly a year passed before reality hit. These birds were too big and too black-backed to be Lesser Black-backed. They were Kelp Gulls.

In June of 1990, O'Meallie revisited Curlew Island and confirmed that the Kelp Gull pair had returned (Purrington 1990). The next bombshell hit on 31 July 1990, when Richard Martin photographed another adult Kelp Gull (male by size) on nearby North Gosier Island. Incredibly, this bird was paired with a Herring Gull, and the pair was guarding a fledgling (Dittmann and Cardiff 2003). In just over a year, Louisiana had had its first records of Kelp Gull, of breeding Kelp Gull, of breeding Herring Gull, of interbreeding between Kelp and Herring Gulls, and of a hybrid Kelp × Herring Gull.

Fast forward to the summer of 1994. Shortly after her trip to Curlew Island on 26 June, Charlotte Seidenberg sent us photographs of a Kelp Gull she had observed. Of course, confirmation of at least one Kelp still present was important. But our eyes were drawn to blurry images of other large gulls in the background: adult Herring Gulls, and a mysterious adult bird with a dark gray mantle similar in color to that of a *gallusii* Lesser Black-backed Gull. We could not

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Seabird colony. *Curlew Island, Louisiana;*  
11 June 1999. © Steven W. Cardiff.

For fifteen years, the Chandeleur Islands, located in the Gulf of Mexico off the coast of Louisiana, have harbored a small population of interbreeding Herring and Kelp Gulls. This article examines the Chandeleur Islands' recent and ongoing "natural experiment" with hybridizing gulls and addresses the consequences for students of bird identification and bird biology alike.



Adult male Kelp Gull shading a small chick. *Curlew Island, Louisiana;* 11 June 1999. © Steven W. Cardiff.

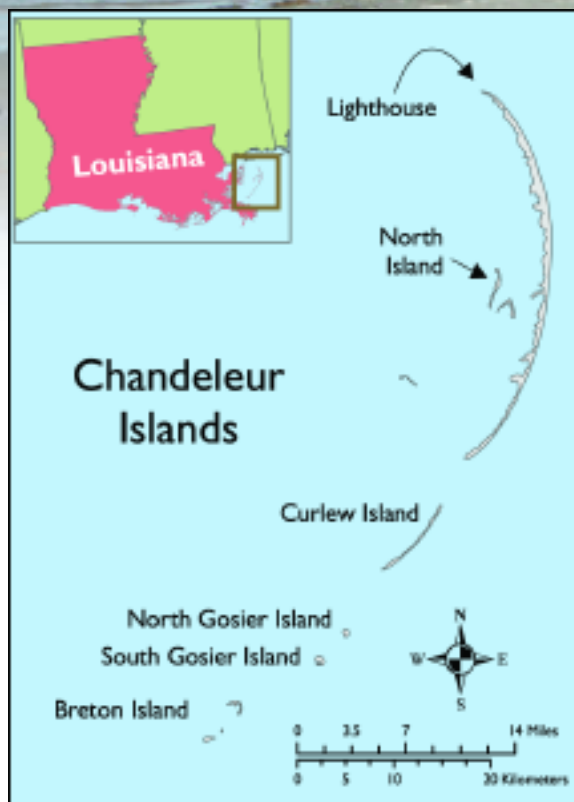




**Fig. 1a.** Typical scenery off the coast of Louisiana: “Chandeleur” Gulls in the foreground, an offshore oil rig in the background, and hordes of Brown Pelicans, Laughing Gulls, and Royal Terns in between. Breton Island, Louisiana; 8 June 2004. © Donna L. Dittmann.

help but think that had it survived, the North Gosier hybrid fledgling would now be four years old and in definitive plumage—like the mystery bird.

Our curiosity aroused, we accompanied Larry O’Meallie on our first visit to Curlew Island on 23 July 1994. We could not have anticipated the magnitude of the large gull presence on Curlew Island. In addition to a few sub-adult Herring Gulls (presumed non-breeders), we observed *ten* territorial pairs of large gulls spaced along the seven-mile length of the island, and we located several nests with eggs or chicks. We were treated to our first in-person looks at *the* pair of Kelp Gulls. Seven pairs of Herring Gulls represented the first breeding record of pure pairs in the Gulf of Mexico, confirming our suspicion that recruitment of Herrings had continued since Richard Martin’s discovery of the Kelp–Herring pair on North Gosier. We found two additional adult Kelp Gulls (females by size), one paired with a Herring Gull, and the other paired with (presumably) the same “mystery gull” from the Seidenberg photos. After seeing the mystery bird up close, we were convinced that it had to be a first-generation (F1) Kelp × Herring hybrid.



**Fig. 1b.** Louisiana’s Chandeleur Islands. © Kei Sochi.

Realizing that an important phenomenon was in progress, we obtained a special-use permit to study gull colonization and hybridization at Breton National Wildlife Refuge on the Chandeleur Islands. Additionally, we wanted to establish whether these potential predators would impact local tern and skimmer colonies. Despite constraints on funding and access, we managed to visit the islands several times from 1997–2004; trip reports and photographs from other observers have also helped fill some of the gaps in our coverage.

During a brief survey of Curlew Island in June of 1997, the original pair of Kelp Gulls was not observed. However, there were now three F1s, each paired with a Herring Gull. Two pure Kelps were also observed, one paired with a Herring Gull, the other observed flying offshore. And in addition to another pure Herring pair, there were two adult F1s (without mates in attendance), 4 sub-adult Herrings, and one subadult F1. Of particular interest was another hybrid with a noticeably paler mantle than an F1's. This was our first hint that backcrossing between hybrids and Herring Gulls had successfully produced second-generation (F2) hybrids.

More extensive surveys in 1998 confirmed that large gulls were present only on Curlew and North Gosier and South Gosier Islands. The number of adults and near-adults had roughly tripled to 75 individuals and at least 22 breeding pairs. Two breeding Kelp Gulls persisted on Curlew Island, but they were females (one paired with a hybrid, the other probably paired with a Herring). A third Kelp (on South Gosier Island) was determined to be unpaired and was collected (Fig. 2). Adult Herring Gulls had increased to 47, with at least 9 pure pairs, a few paired with non-Herrings, and a fair number that appeared to be unpaired. We could account for 14 hybrids



**Fig. 2.** Top: **Male Kelp Gull** (LSUMZ 165987). Middle: **First-generation (F1) hybrid female Kelp × Herring Gull** (LSUMZ 169433). Bottom: **Female Herring Gull** (LSUMZ 52544). Mantle color of the F1 is intermediate between that of the parental species. This Kelp Gull specimen is the first for North America. © Donna L. Dittmann.



**Fig. 3.** Mantle color of a first-generation hybrid **Kelp × Herring Gull** (center) is approximately the same shade as that of a Laughing Gull (right). This is a classic F1, with mantle coloration intermediate between that of the two parental species and with bright greenish-yellow legs. This individual was identified as a female based on its size and proportions relative to its mate; it was smaller and more delicate. Curlew Island, Louisiana; 10 June 1998. © Steven W. Cardiff.

(mostly F1s, plus one paler second-generation type), most of which were paired with Kelps, hybrids, or Herrings.

It was fortunate that we were able to survey most of the suitable breeding islands during the summer of 1998, because some big changes were in store for the Chandeleurs. On 28 September of that year, Hurricane Georges ravaged the islands. Although only a Category 2 storm, Georges had a slow forward speed and caused much damage. Storm surge resulted in serious erosion and fragmentation of many islands. Curlew Island was 80% destroyed, North Gosier was completely eliminated, and South Gosier was severely reduced. Fortunately, the summer nesting season was over, and most of the breeding birds had presumably departed.

It was interesting to witness how the birds responded to the loss of “traditional” colony sites and compaction of individual breeding territories during the 1999 breeding season. For starters, part of the North Gosier Brown Pelican colony relocated to what was left of Curlew Island. High ground on Curlew Island was packed with nesting pelicans and thousands of Laughing Gulls; as a result, the island was abandoned by thousands of Royal and Sandwich Terns, as well as by a small Sooty Tern colony. Curlew Island’s large gulls, previously spaced along seven miles of beach, were forced to compress their territories into a variety of situations around the perimeter of the island or among pelicans and Laughing Gulls.

It was chaotic trying to determine which large gulls were paired with which—and where the territorial boundaries were. The most noticeable differences from 1998 to 1999 were a reduction in the number of Herring Gulls (few individuals, and none confirmed to be paired with other gulls), and an increase in the number of Herring-like hybrids among the 30 or so hy-



**Fig. 4.** In flight, the primary pattern and dorsal coloration of a **first-generation “Chandeleur” Gull** are similar to those of many Lesser Black-backed or Yellow-footed Gulls: The secondaries are dark gray and have a white apical area forming a conspicuous white trailing edge on the wing; all primaries are white-tipped (although these can be completely worn off by late summer); P1–4 are dark gray with a large white tip; P5 is dark gray with a black subterminal spot or bar, plus a white crescent above on the inner web and a large white tip; P6 shows a black outer web extending partially up the feather, with the inner web dark gray and with a black subterminal band with a white tip; P7 shows a black outer web extending nearly to the base; P8 & 9 show a black outer web and a somewhat paler inner web; and P10 is black with a large, square white mirror. The **near-adult** in this photograph retains more-extensive black in the primaries (P5 & 6 mostly black; P4 with a black subterminal band) and black in the upper primary coverts. By virtue of the flight feathers’ dark coloration, the upper primary coverts look relatively dark in comparison to the white underwing linings, but they *contrast* with the blacker outer primaries. This contrast is a good mark separating this hybrid type from Kelp Gull. Kelp Gull has blacker dorsal coloration, which correspondingly shows less contrast with the outer primaries. We acknowledge, contrary to an earlier publication of ours (Dittmann and Cardiff 1998), that some definitive Kelp Gulls may possess a second smaller mirror on P9. Darker-mantled hybrids (“F2s”) also share this pattern, but there is less contrast between the remiges and coverts, and the pattern of the underwing is more similar to that of Kelp Gull. *Curlew Island, Louisiana; 10 June 1998. © Steven W. Cardiff.*



brids found. We found two Kelp Gulls, neither of which we had previously encountered: one breeding male paired with an F1, and a subadult non-breeder. Presumably, these Kelps were progeny of the original pair of Kelp Gulls, bringing the minimum number of known Chandeleur Kelps up to eight.

The trends noted in 1999 have continued to the present.



**Fig. 5.** Comparison of mantle coloration and bill proportions of definitive males. Top: **Yellow-footed Gull** (LSUMZ 163881). Middle: **F1 Herring × Kelp Gull** (LSUMZ 164737). Bottom: **Lesser Black-backed Gull** (LSUMZ 163881). © Donna L. Dittmann.

The last Kelp Gull was seen in 2000 (presumably, the same breeding male as was seen in 1999). There was a slight resurgence of Herring Gulls in 2000, including a couple of breeding pairs; but only one individual was noted several years later, during our intensive 2004 surveys. Hybrid numbers are holding relatively steady. At last count, there were 18 pairs scattered on Breton, North Gosier, South Gosier, Curlew, and North Islands, with many of these islands showing significant recovery since Hurricane Georges.

### Descriptions of Chandeleur Hybrids

Identification of Kelp and Herring Gulls is covered in various field and specialty guides, so emphasis here will be on identification of “Chandeleur” Gulls. We will concentrate on descriptions of breeding adults, which account for most of our observations of known hybrids. Describing immature or non-breeding adult plumages is much more problematic simply because no one has been able to study the progression of plumages of *known hybrids*, and the whereabouts of the breeding gulls and their progeny during the non-breeding season is unknown. From 1997–2002 we obtained a small series of reference specimens—individuals determined to be without nests or young, to be unpaired, or to be sick. We also banded a few chicks of known parentage. During the breeding seasons of 1994 to 2004, we observed virtually every pair combination conceivable. Mixed pairs included: Kelp × Herring, Kelp × F1, Herring × F1, F1 × F1, F1 × F2, and second-generation (or higher) hybrids with each other or F1s. All pairings produced eggs and/or chicks.

Through 1997 we were confident that the majority of hybrids were F1s, in view of our records of observed pairings,



**Fig. 6.** Hybrid Kelp  $\times$  Herring Gulls exhibit a range of variation in darkness of the upperparts. The leftmost bird is an **adult Kelp Gull**, and the rightmost bird is an **adult Herring Gull**. The four birds in the middle are **hybrids**. © Donna L. Dittmann.

maturation lag-time of the young hybrids, and our assumption that mantle color was intermediate between that of the Kelp and Herring Gull parents (Fig. 2). By 1998, the magnitude of the phenomenon had increased dramatically: Multiple islands were involved, the large-gull population had increased substantially, and we were observing a greater range of hybrid mantle colors and a greater variety of pair combinations. Thus, it was no longer possible to assume that an apparent F1 was really a true F1, as opposed to a second-generation (or higher) progeny of a pair of F1s or of some other backcross combination. Therefore, in the following discussion “F1” refers to a general phenotype (F1s or hybrids that look more or less like F1s; Fig. 2), rather than to hybrids of a specific generation and parentage. “F2” is used to refer to hybrids that are either paler- or darker-mantled than the F1

phenotype; as of the summer of 2004 (14 years after the first hybridization in 1990), some hybrid individuals were likely fourth generation or higher.

#### First-generation Hybrids: Adults and Near-adults

The overall appearance of F1s is generally intermediate between that of the parental species. The exception is that the legs and feet are yellow or greenish yellow and proportionately large and more like those of Kelp Gull. Otherwise, these individuals are proportionately large-bodied (big- and block-headed, heavy-chested, broad-winged) and large-billed (long and thick with a pronounced gonydeal angle). Females are smaller and somewhat more “delicate” in appearance than males. Mantle color is similar to that of Laughing Gull (Fig. 3), and there is one large mirror on Primary (P) 10. The iris is pale (whitish to yellowish white), the orbital ring is typically reddish-orange, and the bill is yellow with a large red gonydeal patch. F1s are distinctly paler than pure Kelps, and contrast is obvious between the dark gray mantle and the black wing-tips (Fig. 4). “Near adults” are similar but have slightly more black in the wing-tip, a smaller and more-rounded mirror on P10, traces of black on the upper greater primary coverts, sometimes a few blackish secondaries, and often smudges of black in the rectrices; such individuals might represent either “advanced” three-year-olds or “retarded” four-year-olds.



**Fig. 7.** This banded individual is a **backcross hybrid** between a Kelp Gull and an F1 hybrid. Its mantle is nearly as dark as a Kelp Gull's. Curlew Island, Louisiana; 8 June 2004. © Donna L. Dittmann.

Thus, it is challenging to distinguish the Kelp–Herring hybrids



**Fig. 8.** Shown here are spread-wing preparations from an **F1 hybrid** (top; LSUMZ 164737, 17 July 1997) and an **F2-type hybrid** (bottom; LSUMZ 165988, 9 July 1998). The F1 is a near-adult retaining black in the upper primary coverts, a smaller mirror on P10, and black on P4. The F2-type has a large, square mirror on P10, typical of adult hybrids, plus a smaller mirror on P9 (the size of the mirror on many pale hybrids is larger). Note that primary molt is in progress on both individuals, with P1 & 2 growing in. © Donna Dittmann.



from superficially similar species possessing a dark mantle, yellow legs, and a pale iris, e.g., Lesser Black-backed and Yellow-footed Gulls. In fact, mantle coloration of F1s is virtually identical to what is shown by those two species (Fig. 5). Being the size of Kelp and Herring Gulls, F1s average larger than Lesser Black-backed Gulls on a sex-by-sex basis, although a small female Chandeleur Gull and a large male Lesser Black-backed Gull could be about the same size.

Most F1s, if seen among Herring Gulls, would look about the same size, not appreciably smaller, as would most Lesser Black-backed Gulls (including many males). Because the proportions of F1s are similar to those of the parental species, the larger size, heavier bill, broader and shorter wings, front-heavy appearance, and heavier-looking legs and big feet are features to separate F1s from Lesser Black-backed Gull.

F1s are more similar to Yellow-footed Gull in terms of size, overall proportions, mantle color, and soft-part colors (Fig. 4). The reddish-orange orbital ring of an F1 (Yellow-footed has *yellow*), any greenish tones to the legs (Yellow-footed has yellow or orange-yellow), and a proportionately slightly longer and thinner bill (Yellow-footed is somewhat shorter and deeper) might be helpful characters to separate them.

### Second-generation Hybrids and Beyond: Adults and Near-adults

F2s can be characterized as anything that doesn't look like the pure parental species or an F1. By 2004, F2 mantle colors varied from nearly as blackish as Kelp Gull to as pale silvery gray as Herring Gull (Fig. 6); variation among individuals can be subtle and difficult to

**Fig. 9.** This large chick of a Kelp-F1 pair is possibly the same individual as shown in Fig. 7. In this photograph, note the bird's incoming juvenile plumage. Curlew Island, Louisiana; 13 July 1998. © Donna L. Dittmann.

assess in the field. Hybrids at opposite ends of the color spectrum are so different from each other and so similar to the parental species that it becomes tempting to identify them as the latter. For example, a Kelp × F1 hybrid is almost as dark-mantled as a Kelp Gull (and may even fall within the normal range of mantle variation for Kelp), and it may be tempting to identify it as a Kelp. A known (banded) Kelp × F1 hybrid observed in 2004 (Fig. 7) appeared very Kelp-like, but it showed some contrast between the mantle and wing-tip—the only character (other than the leg band) separating this bird from a Kelp.

Toward the other end of the spectrum are birds with mantles paler than that of Lesser Black-backed, but sharing other characters of F1s, including on many individuals a single mirror on P10. These relatively pale-mantled Chandeaur Gulls do not usually share the bright yellow or greenish yellow legs of the darker F1s and Kelps, instead being pale yellow, dull yellow with grayish joints, grayish yellow, or greenish gray. The orbital rings range from orange to orange-yellow to yellow. Hybrids with yellow legs may invite confusion with Yellow-legged Gull; a large, heavy-billed male Yellow-legged would be especially problematic. Hybrids with gray legs may suggest larger individuals of the northern Great Plains subspecies (*albertaensis*) of California Gull, but Chandeaur Gulls average proportionately shorter- and broader-winged and heavier-billed, and they have pale (not brown) eyes; definitive hybrids would also lack California's dark bill smudge and more-extensive white mirrors on P9 and P10.

The lightest-mantled hybrids are virtually Herring-colored (Fig. 6), and some of these individuals can have a Herring-like primary pattern, including a small mirror on P9 (Fig. 8). The lack of distinct pink tones on the legs and feet would be the best clue that such a bird might be a hybrid. Of course, leg coloration can be difficult to assess, especially at a distance or if the legs are shaded, and there are occasional North American reports of Herring Gulls with yellow or gray legs. Thus, identification of pale-mantled Chandeaur Gulls should be made with extra caution, and positive identification may not be possible in some cases.

Near-adults retain subadult characters similar to those mentioned above for F1s.

### Hybrid Immatures and Subadults

One interesting aspect of Kelp × Herring Gull hybridization is how plumage development is affected in hybrids, because the parental species have different plumage-maturation sequences. Both species have been studied by analysis of known-age individuals and are considered “four-year gulls”. Poor (1946) reviewed a large series of banded Herring Gulls (North Atlantic population) and



Fig. 10a. © Donna L. Dittmann.



Fig. 10b. © Donna L. Dittmann.

**Figs. 10a & 10b.** The middle bird in both figures is a **presumed second-basic female F1 Kelp × Herring Gull** (LSUMZ 169433); it is very similar in appearance to the same-age **Lesser Black-backed Gulls** above (LSUMZ 152024; **male**) and below (LSUMZ uncataloged; **female**). Note that the head and nape are white with extensive brownish-gray streaking, that the underparts are white with extensive dark streaking and mottling on the breast-sides, and that the flanks, mantle, and upperwing coverts are mixed with adult-colored feathers. Some feathers have black centers or streaks. The greater upper secondary coverts are brownish-gray and edged with buff, and the tertials are blackish-brown and edged with white with brown and white subterminal markings. The lower rump and uppertail coverts are mainly white, the latter with limited brown banding or spots. The remiges are blackish (the inner webs of the inner primaries being somewhat lighter), and P9 & 10 are still growing in. The tail is blackish-brown and mottled on the outer webs. Individuals of this age-class have dark-brown eyes, and their bills are grayish-green or grayish-flesh, with a black subterminal band and dark mottling on the base. The orbital ring is dark brown, and the legs and feet are grayish-flesh with some greenish tones. Size is a clue to this bird's identity, as this female F1 is larger than the male Lesser-black Gull.





**Fig. 11.** Top: **subadult F1** (LSUMZ 171824, female). Bottom: **Yellow-footed Gull** (SDNHM 15135, female). The similarity of overall proportions (see also Fig. 5) and mantle color of F1s and Yellow-footed Gull complicates field identification of out-of-range Yellow-footed Gulls. This second-year Yellow-footed Gull, collected 15 March 1930, retains worn basic head-and-nape streaking and has not yet begun its primary molt. The second-year F1, collected 27 June 2000, is beginning primary molt (P1 & 2 sheathed); although the tail has a mix of two feather types, the white feathers are worn and the tail is not in active molt. This particular individual had greenish-gray legs, but more-advanced immature Chandeaur Gulls can possess adult soft-part colors. © Donna L. Dittmann.

showed that the four age-classes generally correspond to those described by Dwight (1925).

However, some individuals had plumage characters that were more advanced or retarded than what would have been expected at the corresponding age, e.g., a four-year-old retaining characters typically associated with a three-year-old. Most Herring Gulls assume an adult-like appearance by their fourth year (following their third complete molt), and few individuals in fourth-alternate plumage retain characters typically associated with immaturity, e.g., black on the bill, rectrices, or upper primary coverts. For a basic discussion of Herring Gull plumage progression and appearance, see Olsen and Larsson (2004). Kinsky (1963) watched a captive group of four Kelp Gulls mature, and from observations of his captive flock he reviewed timing of molt and plumage appearance of a large series of specimens collected in New Zealand.

His results also supported Dwight's (1925) four-year plumage-maturation scenario but showed that Kelp Gull has a more "accelerated" maturation so that most individuals look very adult-like when in the third year (following the second complete molt). Birds in third-alternate plumage retain fewer characters typically associated with immaturity (duller soft-part colors or black on the bill, duskiness on the underwing, smaller mirror on P10). Furthermore, Kelp Gulls show a wide range of appearances after the first complete molt (second basic and alternate plumages), including more-advanced-appearing individuals and a wide range of variation in the amount of white in the rectrices (including some individuals with a few all-white rectrices). In short, compared to Herring Gull, a Kelp Gull looks more adult-like at a younger age.

The reality, however, is that we do not know enough about

the non-adult plumages of hybrids to fully understand the range of potential variation. Therefore, the following descriptions and discussions should be considered preliminary. Due to the timing of our visits to the islands, we observed relatively few fully or nearly fully feathered juveniles. Larger juveniles did not necessarily remain in close contact with their parents, so it was difficult to ascertain parentage. Our limited observations suggest that offspring of pale F2 parents are indistinguishable from juvenal-plumaged Herring Gulls.

The plumage of an F1 juvenile looks much like that of a juvenile Kelp or Lesser Black-backed Gull (Fig. 9). In general, the head and neck are white and streaked or spotted with dark brown, with the crown and nape paler and with a prominent dark ear-patch. The mantle, scapulars, and tertials are dark brown with feathers edged by buff

(which likely fades to white) that impart a somewhat scaly appearance. The underparts are white, coarsely mottled or streaked with dark brown. The rump and uppertail coverts are white with dark brown spots or streaking, but they appear pale in comparison to the mantle and tail. The tail is dark brown with white freckling along the edge of the outer web of the outer rectrices.

Overlap of tail pattern between Kelp and Lesser Black-backed Gulls makes minor distinctions reported (e.g., Kelp appears all dark; Pineau et al. 2001) generally unreliable for separating those species from their hybrids. The flight feathers are blackish brown and lack a prominent "window" in the inner primaries. The iris is dark brown, the bill is all dark, and the legs and feet are brownish gray. The bottom line: Juvenile and dark-mantled first-basic F1s may be impossible to separate from Kelp without genetic corroboration. Lesser Black-backed Gull shares similar plumage characters, but should be separable by size, shape, and proportions. Juvenile or first-basic F1s can be separated from *smithsonianus* Herring Gulls by those plumage characters that separate Lesser Black-backed Gull from Herring Gull: uniformly dark inner primaries lacking a paler gray panel in the inner primaries; and a whiter rump and uppertail coverts that contrast with the mantle and tail. The whiter belly and undertail coverts of juvenal and first-basic plumages of Yellow-footed Gull are distinctive and should help facilitate separation of that species. As backcrosses become more Herring-like in appearance, characters suggesting Yellow-legged or Eurasian races of Herring might be expected.

We have identified only a few individuals in their second calendar year as F1s (based on color of partial adult-type

mantle or other characters). One female specimen (DNA confirmation pending) from early August is molting to second-basic plumage, yet retains some aspect of first-basic plumage, and is very similar to Lesser Black-backed or Kelp Gulls. New gray-edged mantle feathers on this specimen lack the contrast and scaly look of juvenal plumage. The iris is brown, the bill is black with a paler grayish-green basal half, and the legs and feet are grayish flesh. A specimen in fresh second-basic plumage (DNA confirmation pending) is also very similar to Lesser Black-backed (Figs. 10a & 10b) and Kelp Gulls.

In fact, body size and perhaps primary extension may be the only way to separate a second-basic F1 from similarly plumaged Lesser Black-backed Gulls. Because mantle coloration of some second-basic Kelps is paler and lacks the more-blackish color of adults (Jiguet et al. 2001), field separation of a second-basic Kelp from an F1 may not be possible. In second-basic plumage, some plumage differences might allow separation from Yellow-footed Gull, which like some Kelp Gulls looks more adult-like at a younger age. A second-basic Yellow-footed Gull has a more-uniformly-gray or brownish-gray mantle and upperwing coverts, and the underparts are largely white. The scapulars are gray with white tips; the tertials are gray with internal blackish markings.

By second-alternate plumage, Chandeleur Gulls can acquire fully white heads and dark gray mantle feathers and therefore are separable from most Kelp Gulls by a paler gray mantle. Some F1s at this age can acquire adult soft-part coloration; others retain signs of immaturity, such as a bicolored or banded bill. An individual with adult bill coloration is therefore similar to the “advanced type” second-year Kelp Gulls described by Kinsky (1963). Individuals retaining black on the bill invite confusion with second-alternate Yellow-footed Gulls, and it may not be possible to separate this species from some F1s at this age due to similarity of size and mantle color; some F1s share the advanced tail pattern of Kelp Gull, possessing a few all-white rectrices (Fig. 11). Darker-mantled hybrids also invite further confusion with Kelp Gull, and because some Kelps are paler-mantled than sub-adults (Jiguet et al. 2001), a positive identification of sub-adults may not be possible.

We have observed third-alternate plumaged individuals of most hybrid categories. Individuals in this plumage are essentially adult-like except for retained signs of immaturity typically associated with three-year-old large gulls—traces of black on the bill, upper primary coverts, and rectrices, along with more-extensive black on the primaries. Identification of these individuals would essentially be as for adults and near-adults.

### Notes on Molt

A discussion of gulls would not be complete without at least a few comments about molt. On the Chandeleur Islands, Kelp, Herring, and Chandeleur hybrids initiate primary molt in asso-

ciation with hatching of eggs, generally from mid-June to mid-July (personal observation). By early August, primary replacement has progressed to about P5 and P6. A presumed F1 photographed by B. Mac Myers III at Fourchon Beach, Lafourche Parish, on 12 October was completing primary molt (P9 one-third grown). Interestingly, that individual had limited head-streaking, which suggests that some hybrids in basic plumage remain relatively white-headed. Some body feathers are replaced from the onset of primary molt to early September (when most birds had departed the islands), but this result was detectable only on specimens. In the field, birds appeared worn and showed no trace of new feathers on the mantle or head.

Primary molt of *non-breeding* sub-adults is earlier than for breeding birds. For example, a bird molting into second-basic plumage on 7 September (Fig. 10b) had mostly fresh head and body plumage, and it was nearing completion of primary (P9 and 10 still sheathed) and rectrix molt. A second individual molting to second-basic plumage on 2 August was less advanced, with primary molt to P8 (two-thirds grown), secondary molt to S3, (S4–6 missing; the rest old and skeletal), all rectrices sheathed (one-half to one-third grown) or missing, and a mix of worn juvenal and first-basic upper wing coverts, scapulars, and tertials; it retained worn first-basic head streaking.

### More Questions Than Answers Remain

Essentially nothing is known of Chandeleur Gulls outside of the breeding period and away from the Chandeleur Islands. Where do they go? Southeastern Mexico? Yucatán? Farther south in the Caribbean, e.g., Trinidad? There are photographs of Kelps as well as of possible Chandeleur Gulls from these areas. Nothing is known of the whereabouts of adult birds that abandoned the islands, especially after Hurricane Georges in 1998. Kelp and Kelp-like birds occurring elsewhere may be displaced Chandeleur birds. Nothing is known of offspring that were produced on—but have not returned to—the islands. Which parental genes direct their movements?

We can only speculate about how Chandeleur Gulls might appear in basic plumage. How much head streaking? Changes in soft-part coloration? Have Chandeleur Gulls been seen elsewhere and gone unrecognized or been misidentified? Possibly. It might be worth paying a little more attention to that strange Herring or Lesser Black-backed Gull. After relatively few generations, alternate-plumaged Chandeleur Gulls represent a myriad of mantle colors, a homogenate of the original colonists. Perhaps before a mystery gull is identified as an extralimital species or subspecies, the hybrid possibility should be considered. Although the number of Chandeleur Gulls remains relatively low, the possibility that individuals may be detected near the Gulf of Mexico and perhaps farther afield does exist and provides new challenges to the field identification of gulls.

There is also the additional insight into what may happen



as expanding gull populations come into contact. And, who knows?—As to the ultimate outcome of the “Chandeleur experiment”, only time will tell. Breeding Chandeleur Gulls currently appear to be restricted to the southern Chandeleur Islands. A pair of Herring-type Gulls was reported during aerial surveys of waterbird colonies, just north of Grand Terre Island in Barataria Bay, Louisiana, 12 June 2001 (Michot et al. 2003); other large gulls may occur on some other barrier islands. Comprehensive aerial surveys of Louisiana’s barrier islands are ongoing and should produce a clearer picture of the Chandeleur Gull’s current distribution in Louisiana.

If the Chandeleur breeding system remains closed, with few or no new colonists, we hypothesize that homogenization of the remaining birds will likely result in birds that resemble the pale (most Herring-like) phenotype—at least in the short term. If the Chandeleur Gull persists, it will represent a novel population, one with a known start time, a known number of initial colonists, and documented hybrid origin. Perhaps it also sheds light on how other gull species may have evolved.

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